DOCUMENT RESUME

ED 157 390 FL 009 573

AUTHOR Pia, J. Joseph
TITLE Grammar and Learner as System: Some Proposed New Directions for Research in Second Language Acquisition. CUNYForum, No. 3.
PUB DATE 76
NOTE 22p.; Paper presented at the annual Queens College Conference on Bilingualism and Second Language Teaching and Learning (2nd, November, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Factor Analysis; *Grammar; Language Instruction; Language Patterns; *Learning Characteristics; Learning Processes; *Learning Theories; Linguistic Theory; *Second Language Learning; *Systems Approach

ABSTRACT

Some aspects of a general systems theory of second language acquisition are as follows: the system is greater than the sum of its parts; each component has a distinctive role in the overall operation of the system; some components may be entire systems themselves; the workings of the system proceed according to patterns, and rules for any given system are limited to that system. A systems perspective of grammar and learner and the interaction of language and learner is presented. Language learning can be interpreted as the building of a system of rules that account for the linguistic behavior of native speakers. Because each language can be attacked component by component, the course developer and teacher should present material from each component in a way and in an order that facilitates learning. A systems approach to account for variance in student achievement involves factoring out distinct dimensions or components and examining which factors exist independently and at what level of analysis. (SW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

GRAMMAR AND LEARNER AS SYSTEM: SOME PROPOSED NEW DIRECTIONS FOR RESEARCH IN SECOND LANGUAGE ACQUISITION

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
J. Joseph Pia
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

J. Joseph Pia

Syracuse University

ED157390

A theory of second-language acquisition, if it is to serve as a guide to the professions of teaching and research in foreign language learning, must be able to do several things. Certainly one is predict whether and under what circumstances learners will succeed or fail. Another requirement is the ability to explain, or give an account of, learner successes or failures. In less general terms, a theory, in order to command our allegiance, must be able to explain why students' achievements vary so much from what our current tests predict. None of the approaches currently in use meet these conditions, though certainly not for want of trying.[1]

My contention is that these central questions will remain unanswerable <u>in principle</u> if we continue to limit ourselves to the conceptual equipment now in use. Rather than attempt to demonstrate that claim, I choose what I hope is a more fruitful tack, namely pointing to an intellectual construct which appears to offer the hope of formulating questions so that they are answerable. That construct is known as General System Theory. Like any other proposed theory, General System Theory consists of a set of related hypotheses some of which appear

FL009573

Copyright © J. Joseph Pia, 1976.

to be relevant to problems of second-language acquisition. I suggest that a consideration of those hypotheses can help us get beyond our current impasses.

The paper proceeds, first, to look at selected aspects of General System Theory and, then, to consider grammar, on the one hand, and learner, on the other, as system. The final paragraphs hint briefly at some implications of this view.

I

We turn now to an overview of General System Theory. This presentation is for readers unfamiliar with the ideas in question.[2] Readers who are acquainted with General System Theory may choose to go on to the next section.

We begin our presentation with an imaginary scene and follow it with some interpretative comments.

A

Imagine, if you will, a device floating in space, a device that consists of a number of smaller devices each of which is merrily doing its own thing. A closer look reveals some other things. The little devices are producing objects or materials. Those objects or materials are carried or flow from the producer to one or several other little devices. Those other little devices in turn are producing still other things. Those things are in turn distributed. Some of them are distributed in patterns which are immediately obvious. Other patterns, however, require much longer looking and more effort on our part to figure out.

We notice that the original device, henceforth the parent device, is also yielding a product. When we examine it closely, we realize that the parent's product bears little similarity to the materials produced by the little devices. Yet it seems quite clear that all the activity within the parent is directed toward producing the parent's product.

So we have a device. It is composed of little devices, i.e., components. They each play a role in developing the product of the parent device. However, the final product, i.e., that produced by the parent, is so different from the components' products that its nature cannot be predicted from the nature of the component products.

Returning now to our scene, we approach the parent device even more closely. As we do, we are able to see that some of the component devices are composed themselves of still smaller devices. The activity among them seems markedly similar to that in the parent. And the relationship between the products of the smaller devices and that of their parent is similar to that between the components and the original parent: the parent product in both cases is not predictable from the natures of the component products.

Suddenly some movement catches our eye. We notice that some of the parent's product is being picked up and carried away. As we follow the path with our eyes, much as we watch a plane from the ground, we become aware of the existence of another device to which the material is being carried. And another. And another. . . . Indeed, there are very many devices like our original parent device,

and materials are being moved about among them in accordance with some prescribed ways. Some of those ways or patterns very quickly emerge as we watch them. Others will obviously require more time and more effort to figure out.

So, we find that our original parent device is in fact a component of some larger device. At this stage we do not know what its product is or what role our original parent device plays in that larger one. Moreover, though the scene becomes too large and the time too long for us to acquire much information about it, we would not be surprised, nonetheless, to find that there are more and larger devices "out there." Further, probably the device of which our original parent is a component is itself a component of one of those larger devices "out there."[3]

B

Now to interpret this scene and thereby to present some salient features of General System Theory.

1

The parent device is clearly intended to represent a system. It includes a number of components, each of which has a role to play in the operation of the parent system. Those roles involve interaction with other components. We have symbolized those interactions as the moving of products from one component to another. It goes without saying, of course, that the products may be non-physical. They may be ideas, or the organization of patterns, or a set of instructions for some next steps, or some numbers, etc. An important aspect to keep

in mind is that the product or outcome of the parent system is not attributable to the roles or outcomes of the components. Another way of saying this is that the system is greater than the sum of its parts.

2

We remember also that the products of the components are passed about and utilized by other components. The use and distribution of products is according to pattern, or to rule. Some of those rules are very quickly comprehensible; others are less so. Their discovery is a goal of research.

3

Another part of the imaginary scene has to do with the fact that some components may themselves be systems. Two aspects of this arrangement deserve our attention. First, we are presented with a hierarchy of systems, with some functioning as parts of others. One consequence is multiple levels of analysis. That is, at one level a component may serve as a unit, while at another level that same component is properly treated as a set of components.

This situation is quite common in our everyday experience. For example, Bever (1973: 49) notes that ordinarily we react not to "two tons of brightly colored noisy metal" but instead to a truck. At the auto shop, on the other hand, the mechanic sees the truck as a set of related systems in each of which things can go wrong. Some of those component systems are the body, the engine, the drive train, the brakes, etc.

Our linguistic experience works this way, too. We know, for example, that at one level sentences are units. They may function independently or they may be part of other sentences. But we know also that sentences consist in constituents like Noun Phrase, which itself is composed of constituents. In other words, we may say that our understanding of language involves implicitly the notion of hierarchically ordered components.

Now let us turn to a second aspect of the arrangement of systems within systems. We noted that the distribution of the outcomes of the components is according to rule. Though it was not represented in our scene, there is a constraint on the rules. Their power is limited to one system. That is, rules appear to govern the workings of a given system, but they do not extend beyond. They do not penetrate to the inner workings of component systems; nor do they extend outward to either other components or the parent, or matrix, system.

This situation also is not foreign to us. For example, when we take our broken blender to the repair shop, they will deal with the motor, or the blades, or the "jar," or whatever. The people at the repair shop know that the principles, i.e., rules, governing the operation of the blades are quite irrelevant to the principles governing the operation of the motor. And the principles affecting the operation of the jar do not extend to the operation of either blades or motor.

We see reflections of this kind of arrangement in sentences, too. For example, there are rules governing embedded sentences. Rules governing the matrix sentence, e.g., certain kinds of movement rules,

do not penetrate to the embedded one, leaving it intact. Similarly, rules which govern the constituents of the embedded clause do not extend into the matrix sentence.

4

We move on now to another question, one to which our scene leads: What kinds of rules can operate in systems? Put another way, the question is, are there limitations on the kinds of rules that can operate? or that can exist? I think that the answer to the second question is yes.

Scholars assume, or perhaps take on faith, that it is in principle possible to make a list of all the possible logical operations that exist in the universe. In other words, the logic by which the universe operates is finite, and everything works according to the same principles.

Now, not everything necessarily uses all the principles or operations available. Instead some number of operations selected from the set of all possible operations will govern the rules which in turn govern the workings of any given system.

Examples of logical operators would include, in their English representation, such notions as "and" and "or," as "union" and "disjunction," as "included," etc. There are, of course, many more. Rules are based on these operators, which may occur either alone or in combination. And the rules are based only on these.[4]

The common logical features shared by systems generally makes other things possible. The possibility that concerns us now is being able to perceive similarities in the operations of systems which appear at one level to be so different.

> To take a simple example, an exponential law of growth applies to certain bacterial cells, to populations of bacteria, of animals or humans, and to the progress of scientific research measured by the number of publications in genetics or science in general. The entities in question . . . are completely different, and so are the causal mechanisms involved. Nevertheless, the mathematical law is the same. (von Bertalanffy, 1968: 33)

Hence, it becomes possible to classify systems not only according to such familiar criteria as the number and types of components or the nature of their outcomes, etc., but also according to the criteria of the logical operations, the kinds of rules by which they operate.

C

Let's summarize what we have learned about General System Theory.

1. Systems are composed of entities that interact in ways to produce properties or outcomes that are not directly attributable to any of the components. The system is greater than the sum of its parts.

2. Each component has its own distinctive role to play in the overall operation of the system.

3. Some components may be entire systems themselves.

4. The outcome or product of a system as well as the system itself may be non-physical or have no physical representation. As scholars we are interested in giving physical representations, usually written, to non-physical objects so that we can look at them and ponder them.

5. The workings of systems proceed according to patterns. We call the specifications of those patterns "rules." In other words the behavior of the system is rule governed.

6. The rules for any given system are limited to that system. Their influence neither penetrates to component systems nor extends outward into the matrix system.

7. Any rule for any system is based on one or more of a finite set of logical operations.

8. The use of operators from a finite set makes it possible to see fundamental similarities across a wide range of phenomena.

II

We move on now to exploring the significance of considering grammar as system.

In order to avoid some pitfalls we need to keep in mind the two senses of the term "grammar." One sense refers to the rules and vocabulary items resident in native speakers. Those rules and items make it possible for native speakers to make in their languages sentences that have never been made before and to make them correctly. Similarly, native speakers can and do understand novel sentences.

The other sense of "grammar" refers to the hypotheses put forward by students of language. Those hypotheses are proposed to account for

the native-speaker abilities noted above. Put in another way, the linguist is attempting to give a representation to the linguistic knowledge of native speakers, thereby making that knowledge public and available for inspection.

Naturally we want our proposals and hypotheses to be correct, to predict accurately what native speakers do. Many of our proposals, however, are at some distance from predicting behavior. Instead they deal with such things as their own internal consistency. And it is here that we begin to find problems, places where internal consistency is apparently impossible to reach with the intellectual equipment currently in use.

An example is the problem of rule ordering. The question has been put as follows: are the rules of a grammar ordered (1) according to a single set of principles that are distinct from the rules (extrinsic ordering) or (2) according to changing circumstances (local or intrinsic ordering)? Scholars have argued very persuasively for each point of view. But no one, apparently, can argue conclusively, since the "opposition" can always find a counterexample which cannot be handled. So we have a paradox. Everyone agrees that the rules are ordered, but there is no consensus on the principles which govern that ordering.

Another example is a problem that is more subtle. I have taken it from Latin phonology. Some nouns belong to declensions that take /s/ as the nominative singular suffix. Now /s/ is a dental fricative, voiceless. Some of the nouns in questions have stems that end in voiced stops, e.g., /urb-/ "city." However, when that voiced stop is followed

by the nominative singular /s/, some scholars hold that it is devoiced, e.g., /urps/. This appears to be a simple case of assimilation, of the voiced stop changing to voiceless under the influence of the voiceless fricative.

Other nouns in this series end in dentals, e.g., /nokt-/ "night," /lit-/ "bed." When followed by the nominative singular marker, the final dentals of the stems are deleted, e.g., /noks/ and /lis/. This also appears to be a simple case in which the dentalness of the /s/ conditions alternations in the stems.

At the current state of the art, however, scholars have no explanation for why the conditioning should operate along the dimension of voicing at one point and that of dentalness at another. Nonetheless, this situation appears to require some way of handling a multidimensional state of affairs if native-speaker knowledge is to be accurately represented.

I propose, now, that we begin to consider some systems notions and their relevance for some of the difficulties faced by current linguistic theory.

One point of significance may be seen in connection with the problem of rule ordering. Currently, linguists postulate that native speakers' grammars consist of two or three components: phonology and syntax or syntax-and-semantics. Typically we consider syntax and phonology each to be all of a piece, to be monolithic. That is, there are phonological rules and there are syntactic rules--phrase structure and transformational. To be sure, phonological rules seem to be more like syntactic transformational rules than like phrase structure rules; but after noting that similarity, there is little more to be said.

Two notions are suggestive here: (1) components are systems, and (2) the rules governing each component are independent. Perhaps neither the phonology nor the syntax are unitary. Much current work implies a non-unitary nature for each component. A systems approach would support those implications and suggest that perhaps each component is composed of subcomponents, each of which in turn operates according to its own principles. Indeed. then, the notion of extrinsic ordering is correct, but the principles involved may be different from subcomponent to subcomponent, making intrinsic ordering somewhat in line with the truth also.

These same systems notions are suggestive of other revisions of current theory as well. For example, there is some concern in the literature with matters of word formation. The rules seem to be similar to more widely occurring syntactic rules, but also somewhat unusual. We should give serious consideration to the possibility of a word formation subcomponent in the syntax.

In general, the principle to be applied is one of separating the two horns of each dilemma with a cleaver and reorganizing them such that the operating principles can be separately ordered in each subsection of the original problem. This approach imposes special burdens. While, on the one hand, we want to allow ourselves the freedom to proliferate possible subcomponents as solutions to various problems, we need also to develop sufficiently a metatheory to evaluate our proposals and send to zero those alleged subcomponents that are errors. In Popper's (1968) terms, we must figure out how properly to test our conjectures.

There is another aspect of this business. If we have multiple components operating to produce linguistic behavior, we can imagine that some such behaviors are the consequence of multiple interactions of multiple components. We are led, then, to another rule of thumb, namely, to factor out of any event or phenomenon as many potential dimensions as possible, considering them as effects which can be assigned to one or another subcomponent or interaction.

Finally, let's consider one more implication of viewing grammar from a systems perspective. Now, presumably the grammar of a first language is the outcome of a grammar-producing device. The language acquisition device proposed by Chomsky and McNeill, or some version of it, can usefully serve as the grammar-producing apparatus for the moment. But, if we follow our rule of thumb and factor out everything we can, we note that the grammar produced and the grammar producer probably constitute separate and distinct systems, each with its own set of rules. Moreover, at this point there is no reason to suppose that the producer can yield only one grammar. Indeed, we can reasonably expect it in principle to produce indefinitely many. Further, during a period limited only by the lifetime of the speaker, it may continue to tinker with those grammars it has already produced.

If this sketch be true, then we can interpret language learning as the building up of a system of rules that account for the linguistic behavior of native speakers. That system in turn guides the learner in emitting linguistic behavior like that of native speakers.

Clearly each language learned, then, is a separate system. Because they are languages, they will share a great number of features, including a selection from the pool of logical principles that govern linguistic systems. In addition, because they are systems, each language learned (or attempted) can be attacked component by component. The task of the course developer and teacher is to present material from each component in a way and in an order that facilitates learning.

While there are many more aspects of consequence that remain to be discussed, suffice it to say for the moment that a systems perspective offers a fruitful prospect for learning how grammars work. There are, it seems to me, many possible lines of research awaiting the attention of scholars.

III

We now move on to a concern with learners. The problem arises, remember, because students vary in their achievement, that is, in their mastery of a second language. In experimental settings the variance seems to occur in spite of constant levels of intelligence as measured by standardized instruments and in spite of exposure to the same instructional settings. The task before us, then, is to develop conceptual frameworks which will allow us to account for that variance.

Any of us who have spent much time in a language classroom know that there is much more at work than "native ability" and teaching method. In our conversations with colleagues about students we are wont to say things like "student X never seems to pay attention," or "student Y should wait a year before beginning study of the language,"

or "student Z seems bright enough, but clearly the message isn't getting through." In the scholarly literature, such matters are often referred to as "motivation." Some scholars (Carroll, 1962; Gardner and Lambert, 1972) are persuaded that (1) there is more than motivation at work and/or (2) motivation is itself a complex consisting in multiple aspects. They and others (e.g., Brown, 1973) refer to "affective factors."

A systems approach would lend credence to this latter view. Our rule of thumb directs us to factor out as many distinct dimensions as possible. The notion of the independence of the inner workings of each component suggests that we not require components to act all alike internally. So, we should be surprised to find that motivation is a unitary, indivisible, notion; instead we begin to factor out the elements involved.

Some efforts have long since been made to include things other than intelligence in tests of language aptitude. For example, Pimsleur, in his Language Aptitude Battery, asks for such things as the testees' attitudes toward the language under study, seeking thereby to get indirectly to "motivation." There appear to be still other factors, however. Some of them seem to be not part of "motivation," though they may have significant impact thereon. What comes to mind are such socially learned things as locus of control (Rotter, 1972), learned helplessness (Hiroto and Seligman, 1975), and expectancies (Porter and Lawler, 1968).

There are conceptual problems with some of these formulations of factors. For example, when taking a close look at expectancy value

theory, we encounter fuzziness in the notions "behavior potential" (Weiner, 1974), "force" (Porter and Lawler, 1968), and "performance." All of these are intended to refer to the same aspect of expectancy, but, as the terms themselves imply, the investigators are working with quite different perceptions of that aspect. A systems perspective suggests that studies of the interactions of the proposed factors ought ultimately to lead to better, i.e., more precise, formulations and to a more complete list of factors.

In sum, we see that the notions of experienced teachers of foreign languages, including some who have left the classroom for the laboratory, are to be taken seriously by those scholars working in a systems framework. Language learning involves much more than "native ability" and teaching method, and some scholars have been looking at that "much more." A systems approach not only leads us to look for the components of that "much More" but also can help us sort out which proposed factors exist independently and at what level of analysis, i.e., which are themselves complexes. Pursuing such paths of inquiry should lead to a much fuller and richer understanding of what learners bring to the learning task.

IV

In this concluding section I want, first, to take note of yet another aspect of a systems perspective and, next, to bring the discussion to a close.

A

The other aspect, implicit in our formulations so far, concerns another set of phenomena, namely, what actually happens in the process of second language acquisition.

Typically, studies seem to assume that new language and learner collide. Classrooms are supposed to make that contact more gentle, or at least less random. Teaching efforts usually take the form of systematic and orderly presentations accompanied by exercises designed to help students learn the material at hand. (By now I hope we realize that the term "systematic" has no connection in most contexts with a systems approach.)

A systems perspective leads to another way of looking at the problem. We want, of course, to present material to students in ways that will make their learning more efficient, more pleasurable, and more effective. In order to do that, however, we need to have a much clearer idea of how new language and learner interact.

We have looked at both learner and grammar from a systems viewpoint. Each appears to be composed of a set of components which interact within each system, either grammar or learner. It seems clear that now we should bring our systems perspective to bear on the interaction of learner and language. That perspective suggests that we look at the interaction not as two total entities coming into more or less violent contact but instead as components interacting with components. Perhaps an even more accurate view of the processes is one of interaction interacting with with interaction. For example, Trabert (1977) is

looking at how expectancies and other factors interact with such things as motivation. Those interactions produce states of various kinds in learners. In some of them certain things are simply not learnable, and no amount of clever pedagogical practice will make them so or enable students to learn them. Presumably some kinds of tinkering in experimental situations will begin to give us handles on how to help students become effective learners and how to tailor our instruction to interact effectively with learner attributes.

Finally, bringing our systems perspective to bear on the language-learner engagement will help us realize that such engagements themselves constitute systems. As such they are amenable to study by those approaches used in studying systems generally. Moreover, the interactions of learner components with grammatical components will lead to properties, i.e., outcomes, which are not attributable to, or predictable from, the properties, natures, or outcomes of the components involved in the interaction. Sensitivity to these issues ought to lead us to heightened appreciation of the enormous complexities and subtleties involved in the language-learning process.

B

In summary, I have made two claims in this paper. The first is that presently used intellectual equipment is incapable of producing answers to questions with which teachers of second languages must deal every day. The second is that adopting a systems perspective offers the hope of dealing with those questions in ways that can yield improved or increased understanding of the language-learning process. A brief

sketch of some of the major ideas of General System Theory, followed by equally brief looks at grammar and learner as system, have yielded suggestions of many possible new directions for research. Those directions offer two hopes. One is that they will lead directly to new knowledge which itself is directly relevant to the problems at hand. A second is shared with almost any proposed line of research, namely, that these directions, even should they prove barren of themselves, will spark new ideas that will be suggestive of still other, promising directions. It seems to me that the promise of potential richness of new knowledge means that a systems approach merits very serious consideration by scholars who work in this trade.

C

Let me add one final note. Language teaching and research in second-language acquisition have long been the stepchildren of the language sciences. The prestige ascribed to these areas has been quite low. Ironically, the adoption of a systems perspective in these fields should now require some changes in the more prestigious subdiscipline of linguistic theory. Indeed, the thrust of theory building must itself change if it is to deal with questions posed by a language-teaching profession informed by General System Theory. Finally, in contrast to the current state of affairs, studies in second-language acquisition from a systems perspective bid fair to have direct and lasting impact on the direction of the language sciences. Such a pleasant change.

Notes

1. A quite full survey, with many references, appears in Valdman (1975).

2. A brief and easily readable introduction to General System Theory is found in Laszlo (1972).

3. This scene is not an exhaustive description of the relevant aspects of system theory. There is no mention of two facts: (1) Interactions between any two components affect all the other components to some degree, and (2) systems have boundaries, edges beyond which the interactions do not extend.

4. How the use of the logical operators represented by "and" and "or" might work out in a cultural setting is presented in Videbeck and Pia (1966).

References

Bertalanffy, L. von (1968). General System Theory. Foundations, Development, Applications. Rev. ed. New York: Braziller.

Bever, T. G. (1973). "Language and perception." In Communication, Language, and Meaning, Psychological Perspectives, G. A. Miller, ed. New York: Basic Books, Pp 149-58.

Brown, H. D. (1973). "Affective Variables in Second Language Acquisition. Language Learning, 23, 231-44. Carroll, J. B. (1962). "The Prediction of Success in Intensive Foreign Language Training." In Training Research and Education, R. Glaser, ed. Pittsburgh: University of Pittsburgh Press.

Gardner, R. C., and W. E. Lambert (1972). Attitudes and Motivation in Second-Language Learning. Rowley, Mass.: Newbury House.

Hiroto, D., and M. Seligman (1975), "Generality of Learned Helplessness in Man." Journal of Personality and Social Psychology, 31 (2), 311-27.

Laszlo, E. (1972). The Systems View of the World. New York: Braziller.

Popper, K. R. (1968). Conjectures and Refutations: The Growth of Scientific Knowledge. New York: Harper Torchbooks.

Porter, L. W., and E. E. Lawler III (1968). Managerial Attitudes and Performance. Homewood, Ill.: Richard D. Irwin.

Rotter, J. B. (1972). Applications of a Social Learning Theory of Personality. New York: Holt, Rinehart and Winston.

Trabert, J. A. (1977). Aptitudes, Expectations and Achievement in Foreign Language Learning.

Valdman, A. (1975). "Learner Systems and Error Analysis." In Perspective: A New Freedom, G. A. Jarvis, ed. The ACTFL Review of Foreign Language Education, 7. Skokie, Ill.: National Textbook Co., pp 219-58.

Videbeck, R., and J. Pia (1966). "Plans for Coping: An Approach to Ethnoscience. Anthropological Linguistics, (Nov), 71-76.

Weiner, B. (1974). Achievement Motivation and Attribution Theory. Morristown, N. J.: General Learning Press.